

A NEW SPECIES OF *MICROLICIA* (MELASTOMATACEAE)  
ENDEMIC TO RESTINGAS IN BAHIA, BRAZIL

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ABSTRACT

**Microlicia goldenbergii** is proposed as a new species from *restingas* of Canavieiras municipality, Bahia, Brazil. It can be recognized by a combination of ovate leaves with margins and apices that are conspicuously revolute, rectangular petioles 0.1–0.2 mm long, adaxial foliar surfaces that are smooth and glabrous to sparsely glandular-punctate, hypanthia densely glandular-punctate and covered with a few scattered eglandular trichomes 0.3–0.7 mm long that are concentrated only at the torus, dimorphic stamens with polysporangiate anthers and 3–4-locular ovaries. We provide line drawings, photographs, comments on the distribution *M. goldenbergii* and four putative relatives (*M. restingae*, *M. subsetosa*, *M. confertiflora* and *M. cordata*), and a distributional map.

KEY WORDS: endemic, Microlicieae, Brazilian Atlantic coast, polysporangiate anthers

RESUMO

**Microlicia goldenbergii** é proposta como uma nova espécie das *restingas* do município de Canavieiras, Bahia, Brasil. A espécie pode ser reconhecida pela combinação de folhas ovais com margens e ápices conspicuamente revolutos, pecíolos retangulares 0.1–0.2 mm compr., faces foliares adaxiais lisas e glabras ou esparsamente pontuado-glandulosas, hipantos densamente pontuado-glandulosos e esparsamente recobertos por tricomas eglandulares 0.3–0.7 mm compr. concentrados no torus, estames dimórficos com anteras poliesporangíadas e ovários 3–4-loculares. São fornecidas ilustrações, fotografias, comentários sobre a distribuição de *M. goldenbergii* e quatro taxa provavelmente relacionados (*M. restingae*, *M. subsetosa*, *M. confertiflora* e *M. cordata*), e uma mapa com a distribuição dessas espécies.

INTRODUCTION

*Microlicia* D. Don is a neotropical genus of Melastomataceae that currently comprises ca. 170 species, of which only about 10 occur outside Brazil (Pacifico et al. 2020; Flora do Brasil 2020). This genus is one of the common floristic elements of the *campo rupestre* (Alves & Kolbek 2010; Martins & Almeda 2017), a Brazilian mountain-top ecosystem occurring above 900 m that grows on lithosols associated with outcrops of quartzite and sandstone (Vasconcelos 2011; Alves et al. 2014). *Microlicia* attains its greatest richness in the Brazilian states of Minas Gerais (81 spp.), Bahia (57 spp.) and Goiás (24 spp.) (Fritsch et al. 2004; Martins & Almeda 2017; Flora do Brasil 2020).

*Restingas* are coastal ecosystems on quaternary sandy deposits along the Brazilian coast (from 4°N to 34°S) under the influence of the Atlantic Ocean's regressions and transgressions (Lacerda et al. 1993; Cerqueira 2000). The vegetation of *restingas* consists of more than 1,500 species (Restinga Net 2020) and is highly variable along the more than 7,300 km of the Brazilian coast (Rizzini 1979; IBGE 1992; Silva 1999). In relevant phytogeographic treatments of Brazil such those of Rizzini (1979) and IBGE (1992), the *restingas* have not been considered as a true biome, as they are largely composed of plants from other biomes that colonized geologically recent coastal areas, a process that could explain its low levels of species endemism (Cerqueira 2000). Here we describe a new species of *Microlicia*, which is only the second species of this genus endemic to *restingas*.

## MATERIALS AND METHODS

Representative collections of *Microlicia* were examined in Brazilian (ALCB, BHCB, CEN, CEPEC, ESA, HB, HUEFS, HUEM, IBGE, MBM, R, RB, SP, SPF, UEC) and other herbaria (BM, BR, CAS, K, M, P) (acronyms according to Thiers 2020). Comparative morphological features of *Microlicia confertiflora* Naudin and *M. cordata* (Spreng.) Cham. were obtained from Pacifico and Fidanza (2018). In turn, characters of *M. restingae* R. Romero & Woodgyer were obtained from Romero and Woodgyer (2018) and examination of an isotype of this species, and features of *M. subsetosa* Schrank & Mart. ex DC. were obtained from its protologue and online type images available at the JSTOR Global Plants website (<http://plants.jstor.org/>). We used QGIS 3.4.6 (QGIS Development Team 2020) to map the new species' distribution using coordinates given on the exsiccatae labels. We use the term "glandular-punctate" to describe surfaces covered with gland-tipped trichomes that are borne on a peduncle that is too short to be seen with a typical stereomicroscope. For details on the anatomy of these trichomes see Carmo et al. (2019).

## RESULTS AND DISCUSSION

***Microlicia goldenbergii*** Almeda & R. Pacifico, **sp. nov.** (Figs. 1, 2, 3A–D). TYPE: BRAZIL. BAHIA: Canavieiras, estrada para Santa Luzia, a 3 km da entrada da estrada, 15°32'23"S, 39°06'41"W, 15 Feb 2014, fl. and fr., R. Goldenberg 1712, A. Amorim, L. Marinho, L. Daneu, & F. Michelangeli (HOLOTYPE: UPCB!; ISOTYPES: CEPEC!, NY!).

Copiously branched erect **shrubs** 0.3–0.8 m tall. **Branchlets** light green (when fresh), quadrangular, glandular-punctate and moderately to densely covered with eglandular trichomes 0.3–0.7 mm long, the stem angles with wings ca. 0.1 mm wide, nodes covered with a few longer eglandular trichomes 1.2–1.8 mm long. **Leaves** spreading with margins and apices revolute (both when fresh and when dry), decussate, subsessile or shortly petiolate, not imbricate, up to 2 times longer than the internodes; petioles 0.1–0.2 mm long, rectangular; blades 2–3.5 × 1.5–2 mm, ovate, chartaceous, both surfaces vivid green when fresh, the adaxial surfaces blackened when dry, base rounded, margins entire and prevailingly glabrous or sparingly ciliate with eglandular trichomes 0.3–0.7 mm long, the apices acute terminating in solitary eglandular trichomes 0.3–0.7 mm long, adaxial surfaces smooth and glabrous to sparsely glandular-punctate, abaxial surfaces densely glandular-punctate and sparsely covered with eglandular trichomes 0.3–0.7 mm long mainly around the veins, 3-nerved from the base, the veins slightly impressed on the adaxial face and slightly prominent on the abaxial face, tertiary veins absent. **Flowers** 5-merous on pedicels 0.2–0.4 mm long, solitary, axillary or terminal; **hypanthia** (at anthesis) 1.5–1.8 mm long, 1.4–1.7 mm wide at the torus, reddish when fresh turning cream-colored when dry, campanulate, densely glandular-punctate and covered with a few scattered eglandular trichomes 0.3–0.7 mm long, which are concentrated only at the torus; **calyx tubes** 0.3–0.4 mm long; **calyx lobes** (at anthesis) 1.2–1.5 mm long, 0.5–0.6 mm wide (at the base), ovate to foliaceous, margins entire and glandular-punctate, apices acuminate terminating in an eglandular trichome 0.5–0.8 mm long, indumentum like that of the hypanthia; **petals** 7.4–7.6 × 5.4–5.6 mm, obovate, magenta, margins minutely ciliate with tiny gland-tipped trichomes, apices acute terminating in an eglandular trichome 0.5–0.8 mm long, apical trichome deciduous, both surfaces glabrous; **stamens** 10, dimorphic; larger (antesepalous) stamens 5, filaments 3.6–3.7 mm long, magenta, connectives ventrally prolonged 4.7–4.9 mm below the thecae, pink, appendages 0.7–0.8 mm long, magenta at the base and yellow at the apex, apex truncate, thecae 1.3–1.4 mm long (excluding the rostrum), oblong, purple, externally corrugate (polysporangiate), rostra 0.3–0.4 mm long, white with the base yellowish, the circular pores ca. 0.2 mm wide; smaller (antepetalous) stamens 5, filaments 3.2–3.3 mm long, magenta, connectives ventrally prolonged 1–1.1 mm below the thecae, yellow with magenta stains, appendages inconspicuous, apex truncate, thecae 1.1–1.2 mm long (excluding the rostra), oblong, yellow, externally corrugate (polysporangiate), rostra 0.5–0.7 mm long, the circular pores ca. 0.2 mm wide; **ovaries** 1.4–1.5 × 0.7–0.8 mm, cylindrical, superior, glabrous, 3–4-locular, the carpels emarginate at the apex; styles ca. 5 mm long, linear, magenta, stigma punctiform. Loculicidal capsules 3–3.3 × 2.6–2.9 mm (when mature), ovoid, brownish (when dry), initially enveloped by the hypanthium, then tardily rupturing and flaking away with age, the apex

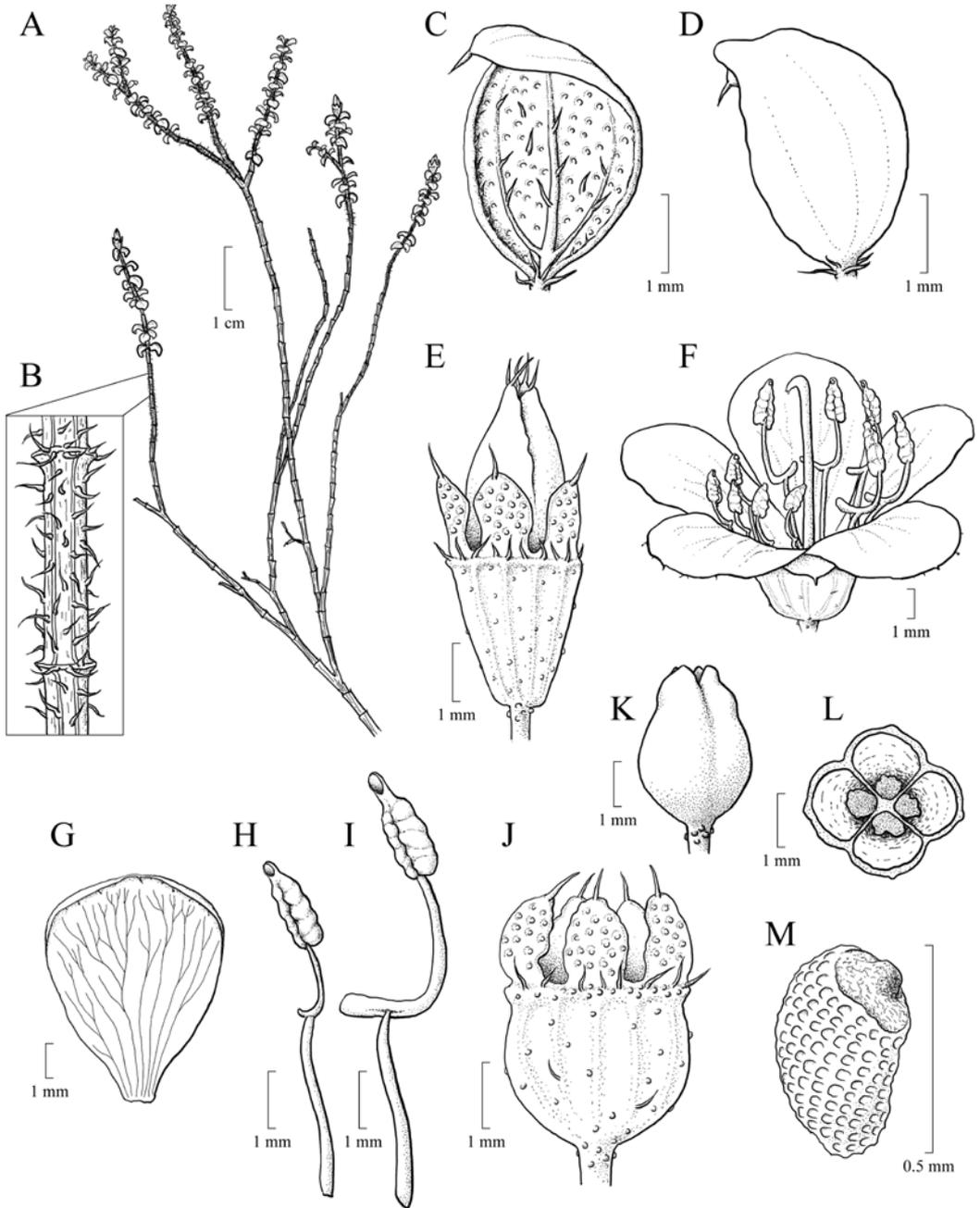


FIG. 1. *Microlicia goldenbergii*. A. Habit. B. Detail of the indumentum on the branches. C. Leaf (abaxial surface). D. Leaf (adaxial surface). E. Floral bud. F. Flower. G. Petal (adaxial surface). H. Antepetalous stamen. I. Antesepalous stamen. J. Capsule enveloped by the hypanthium and calyx lobes. K. Capsule in lateral view. L. Capsule in cross section. M. Seed. Drawn from *Goldenberg et al.* 1712.



Fig. 2. *Microlicia goldenbergii*. Photograph of paratype at US.

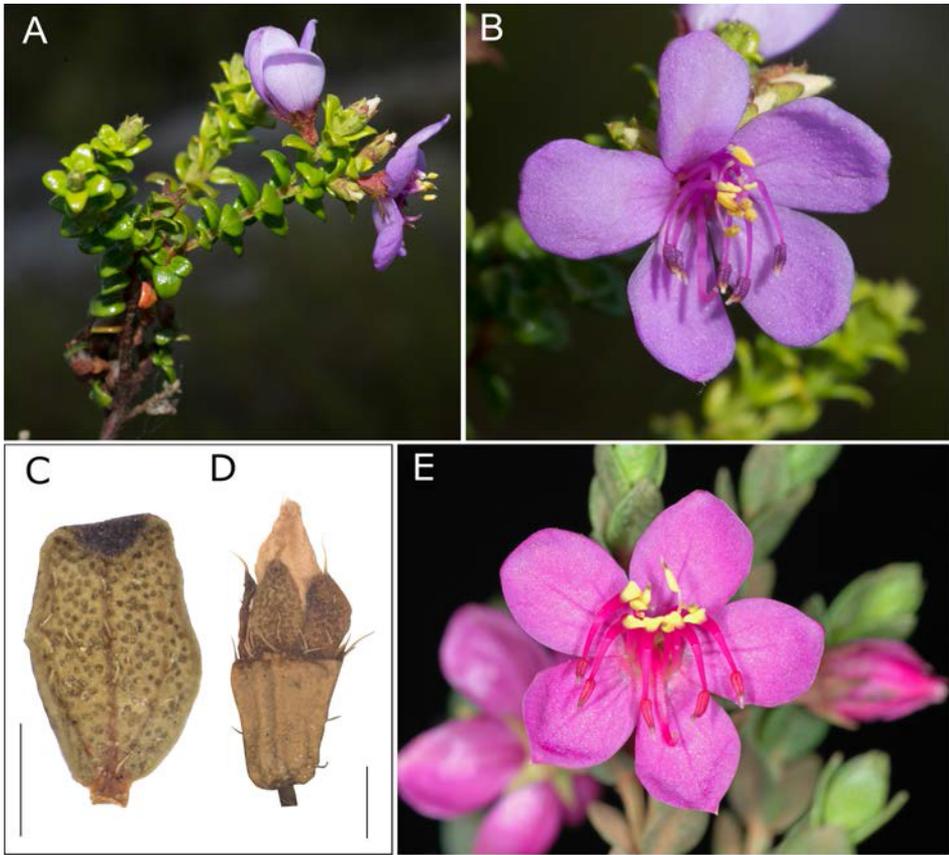


FIG. 3. *Microlicia goldenbergii* and *M. confertiflora*. A–D. *M. goldenbergii*. A. Flowering branch. B. Flower. C. Leaf (abaxial surface). D. Floral bud. E. *M. confertiflora*, flower. Photos A–D were taken from the type collection, Goldenberg *et al.* 1712.

exceeding the torus when mature, dehiscent from the apex to the base, columellas deciduous. **Seeds** ca. 0.7 mm long, oblong-reniform, the testa reticulate.

**Recognition.**—*Microlicia goldenbergii* can be recognized by its ovate leaves with margins and apices that are conspicuously revolute, rectangular petioles 0.1–0.2 mm long, adaxial foliar surfaces that are smooth and glabrous to sparsely glandular-punctate, hypanthia densely glandular-punctate and covered with a few scattered eglandular trichomes 0.3–0.7 mm long that are concentrated only at the torus, dimorphic stamens with polysporangiate anthers and 3–4-locular ovaries.

**Additional specimens examined.**—BRAZIL. **BAHIA:** Canavieiras, Campinas, 13 Jun 2003, fl. and fr., G. Hatschbach *et al.* 75217 (CESJ, FUEL, HUFU, FURB-online image!, MBM!, RBL); Rodovia Camacan–Canavieira, 11 Apr 1965, fl. and fr., R.P. Belem & M. Magalhães 802 (CEPEC-online image!, US!); Canavieiras, Apr 1965, fl. and fr., M. Magalhães 19645 (HB, MBM!).

**Etymology.**—We take pleasure in naming this species for our colleague, Dr. Renato Goldenberg (1968–), Professor of Botany in the Departamento de Botânica, Universidade Federal do Paraná, Curitiba, Paraná, Brazil. Renato has been a productive systematic botanist specializing in the large and diverse family Melastomataceae. He has been a valued collaborating colleague and a mentor to numerous graduate students.

**Distribution, Habitat, and Phenology.**—*Microlicia goldenbergii* is known only from *restingas* in the municipality of Canavieiras, Bahia. It was collected on sandy soils at elevations of about 80 m, flowering and fruiting in February, April and June.

TABLE 1. Additional comparative morphological features among *Microlicia goldenbergii* and putative relatives.

	<i>M. confertiflora</i>	<i>M. cordata</i>	<i>M. goldenbergii</i>	<i>M. restingae</i>	<i>M. subsetosa</i>
Leaf blade length	2.5–8	3–11	2–3.5	4–10(–12)	3–7.2
Leaf blade width	1–6	2.6–11	1.5–2	1.5–2.5	1.1–3.7
Leaf adaxial surface	GP	GP	glabrous/GP	GP	GP+ET
Leaf abaxial surface	GP	GP+ET	GP+ET	GP+ET	GP+ET
Pedicle length	1.5–2	2	0.2–0.4	1–2	ca. 0.8
Hypanthium length	2–2.5	2.5	1.5–1.8	2.5–3	2.6–3
Calyx lobe length	1.5–3.5	3.5	1.2–1.5	2–3	3–3.5
Petal length	6–8	5.8–6.2	7.4–7.6	7.5–9	8.8–9.3
Anthers	tetrasporangiate	tetrasporangiate	polysporangiate	polysporangiate	polysporangiate
Ovaries	3-locular	3-locular	3–4-locular	3-locular	3-locular

Abbreviations: GP, glandular-punctate; ET, glandular trichomes. All measurements are in millimeters (mm).

**Conservation Status.**—All the collections of *M. goldenbergii* come from unprotected areas. This species is known from four collections of which only one has definitive coordinates; we were unable to estimate the EOO and AOO for *M. goldenbergii* and suggest a conservation status of Data Deficient (DD) following IUCN Standards and Petitions Subcommittee (2019) guidelines.

**Affinities.**—*Microlicia goldenbergii* is morphologically similar to *Microlicia restingae*, with which it shares the glandular-punctate branchlets covered with eglandular trichomes, leaves adaxially smooth and glabrous to sparsely glandular-punctate, abaxially densely glandular-punctate and covered with eglandular trichomes, calyx lobes terminating in a eglandular trichome, magenta petals and dimorphic stamens with bicolored polysporangiate anthers. *Microlicia goldenbergii* differs by its thick ovate leaf blades (vs. lanceolate) 2–3.5 mm long (vs. 4–12 mm long), with the apical region conspicuously revolute (vs. flat), hypanthia with eglandular trichomes distributed along the torus (vs. solitary trichomes only between the calyx lobes), and shorter calyx lobes 1.2–1.5 mm long (vs. 2–3 mm long) that are ovate to foliaceous (vs. triangular).

Other possible relatives are *M. subsetosa*, *M. confertiflora* (Fig. 3. E), and *M. cordata*. The new species may be differentiated from these putative relatives by its leaves with the margins and apices conspicuously revolute (Fig. 1. C) and hypanthia covered with a few scattered eglandular trichomes 0.3–0.7 mm long, which are concentrated only on the torus (Fig. 1. E). The three species mentioned above have leaves with the margins and apices flat, hypanthia lacking eglandular trichomes (in *M. confertiflora*), or covered with eglandular trichomes that are homogeneously distributed (*M. cordata* and *M. subsetosa*). Besides, *M. goldenbergii* differs from *M. confertiflora* and *M. cordata* by its polysporangiate anthers (vs. tetrasporangiate), and from *M. subsetosa* by its calyx lobes 1.2–1.5 mm long (vs. 3–3.5 mm long) that are ovate to foliaceous (vs. triangular). Additional comparative morphological features are presented in Table 1.

**Notes on geographical distribution.**—*Microlicia goldenbergii* is the second species in this genus apparently endemic to restingas in Brazil, along with its probable relative *M. restingae* (Romero & Woodgyer 2018). These two species may occur sympatrically in Canavieiras. The remaining compared species are largely restricted to the Cadeia do Espinhaço. *Microlicia cordata* is more widely distributed and is known from the Chapada Diamantina (Santos & Silva 2005), Cerrado in western Bahia (e.g., Moura 1887, UB), mountainous regions in the states of Minas Gerais (Romero & Martins 2002; Matsumoto & Martins 2005; Rodrigues 2005; Rolim 2011; Araujo 2013; Hemsing 2018; Pacifico & Fidanza 2018), Rio de Janeiro (Baez *et al.* 223, RB), São Paulo (K. Mastumoto *et al.* AD 73, UEC), and extends its distributional range to restingas in southern Bahian municipalities of Caravelas (*Hatschbach 49500* & J.M. Silva, MBM) and Prado (*de Jesus 647*, CEPEC, US). To our knowledge, *M. cordata* has never been collected in Canavieiras and there is no evidence of sympatry between *M. cordata* and *M. goldenbergii*. In turn, *M. confertiflora* occurs from southern Cadeia do Espinhaço in Minas Gerais (Matsumoto & Martins 2005; Rodrigues 2005; Martins *et al.* 2009; Rolim 2011; Araújo 2013; Hemsing 2018; Pacifico & Fidanza 2018) to Serra Geral de Caitité in south-central Bahia (*Harley et al.* 21322, K, US). Finally, *M. subsetosa* occurs in Rio de Contas (*Harley et al.* 54256, HUEFS), Barra da Estiva (*Harley et al.* 15701,

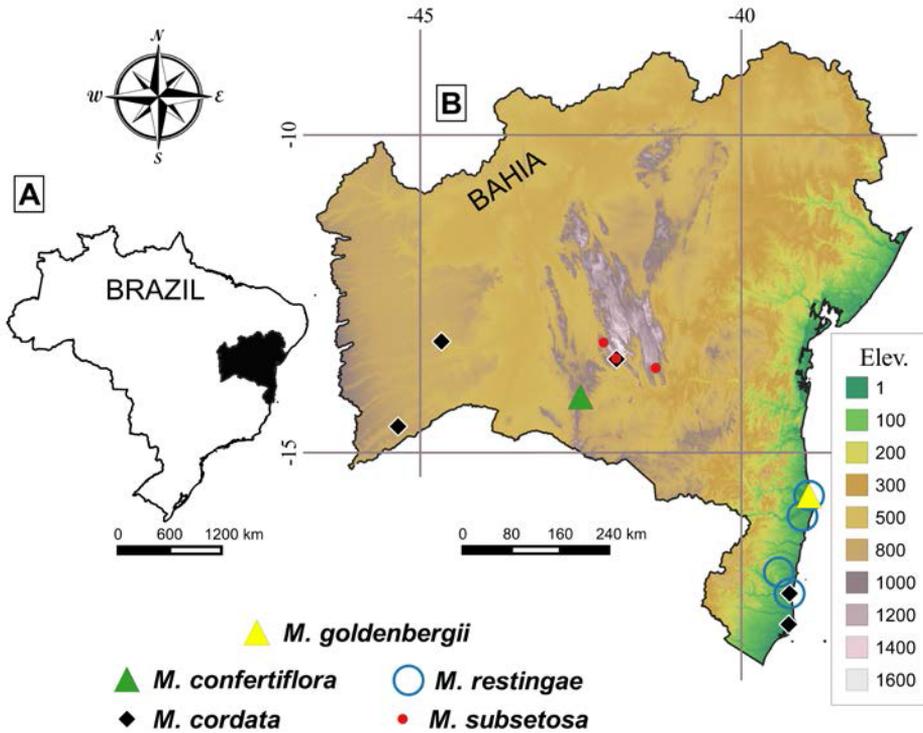


FIG. 4. Distributions of *Microlicia goldenbergii* and putative relatives in the state of Bahia, Brazil. **A.** Brazil highlighting the state of Bahia. **B.** Bahia with the records of *M. goldenbergii* and putative relatives.

CAS), and Érico Cardoso (Mori 13584, NY), Bahia. The distributions of *M. goldenbergii* and its putative relatives in the state of Bahia are mapped in Figure 4.

The floristic relationships between *campo rupestre* and *restingas* are of biogeographical interest and were evaluated in detail by Alves et al. (2007) who reported an exclusive *campo rupestre* – *restingas* disjunct distribution pattern for 8 plant species. Species of *Microlicia* are considered typical elements of *campo rupestre* (Alves & Kolbek 2010) and this particular type of distribution was reported for the first time in Melastomataceae for *Microlicia longisepala* Wurdack, which is restricted to the Chapada Diamantina and in Mata de São João in the Bahian coastal region (Almeida & Pacifico 2018). The two species of *Microlicia* known exclusively from *restingas* (*M. goldenbergii* and *M. restingae*) have relatives in *campo rupestre*, sometimes expanding into the Cerrado; this provides further support for biogeographic relationships among these bioregions.

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